
Third Annual Parabolic Trough Workshop Thermal Storage

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FY2000 Accomplishments & Direction for FY2001

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Industry: Nexant, Pilkington (FLABEG), Kearney&Associates

Trough Thermal Storage Up to Now

- One year ago had no storage system for trough technology
- Now have near-term solution to storage problem
 - \$27 to \$32/kWh for Rankine plant (80 MW/3 hrs)
 - Further cost reductions possible with thermocline tests at Sandia
 - Development risk low enough that commercial system could be built

Trough Thermal Storage Up to Now

- Progress on Advanced Storage
 - Emphasis on direct, sensible heat storage – phase change and chemical storage judged unrealistic for required scale
 - Advanced heat transfer fluid development
 - Have two proposals from universities for advanced heat transfer fluid development
 - Have begun discussion with industry for heat transfer fluid development



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SunLab

Sandia National Laboratories, Albuquerque, NM
National Renewable Energy Laboratory, Golden CO

Trough Roadmap Metrics for Thermal Storage

	2005	2010	2015	2020
Cost, \$/kWht	25	15	10	10
Efficiency	0.80	0.90	0.95	0.95

- Current status: \$27–32/kWht and ~0.90 efficiency
- On schedule with roadmap development path

Proposed Storage Emphasis Next Year

- Near-term system should be de-emphasized
 - has low enough development risk that a commercial system could be built now
- Dramatic improvements necessary to continue to meet metrics/can't meet metrics with near-term system design
 - SunLab should focus efforts on advanced storage
- Advanced Storage Challenge: Need Heat Transfer Fluid
 - Cost: \$8/kWh
 - Subatmospheric vapor pressure at high temperatures (400°C – 450°C)
 - Volumetric specific heat: ~2.0 MJ/m³-°C
 - Thermal stability to at least 425 °C
 - Low freeze point



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FY2001 – Proposed Advanced Storage Activities

- Heat Transfer/Storage Fluids Development
 - Inorganic (conventional) salts
 - Doping to lower salt freezing points
 - Explore concepts for freeze protection in field
 - USA Trough II subcontract with SunLab assistance
 - Kearney & Associates with Pilkington (FLABEG)
 - Organic salts
 - Fluid development at early stages – currently only made in very small quantities
 - SunLab evaluating two university proposals for subcontracts
 - Hydrocarbon
 - Work with current heat transfer fluid industry (e.g. Solutia, Dow) for possible alternative fluid development programs

FY2001 – Proposed Near-Term Storage Activities

- Development of detailed preliminary system design
- Prototype test at Sandia (include heat exchanger)
- Prototype test at SEGS plant

FY2001 Proposed Activities

- Other types of storage
 - concrete
- Industry support



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